What is claimed is:

1. A method for producing hydrazine that can exist at room temperature and atmospheric pressure, comprising;

   A) subjecting molecules of nitrogen in their ground vibrational state to two-photon absorptions, using nanosecond high-energy laser pulses of wavelengths near infrared and blue-purple ranges to form excited nitrogen from said ground state;

   B) interacting said excited nitrogen subjected to said near infrared wavelengths (0.75 – 1 micron) with high-pressure N_2-H_2 mixtures to form said hydrazine; and

   C) alternatively, embedding said excited nitrogen subjected to said blue-purple wavelengths (0.35-0.4 micron) in water to form said hydrazine.

2. A process for producing hydrazine with nitrogen and hydrogen as raw materials and comprising the steps of:

   A) generating a quantity of photons from a high-energy laser pulsed source;

   B) passing said photons through a laser amplifier pumped by an arc lamp to produce photons with increased pulsed intensity;

   C) introducing said intensified pulsed laser photons to excite nitrogen molecules from said nitrogen raw materials through two-photon absorptions so that said nitrogen molecules are induced to make transitions from the ground vibrational state thereof to excited vibrational states in the ground electronic configuration;

   D) flowing said excited nitrogen molecules after said laser pulse excitation to a high-pressure vessel so as to cause effective

collision-mixing leading to a new vibrational energy state;

E) flowing said nitrogen molecules at said new vibrational energy state from said high-pressure vessel to a container containing hydrogen from said hydrogen raw materials which reacts with said new vibrationally excited nitrogen molecules to form hydrazine; and

F) cooling said hydrazine in order to have a liquid form of output.

3. The process of claim 2 wherein the photon wavelengths are from the longest visible red to near infrared wavelengths (0.76 μm to 1 μm).

4. The process of claim 3 wherein said photons used are near-infrared laser photons produced from a Nd: YAG laser.

5. The process of claim 2 wherein the photons come from a short-pulse laser source.

6. The process of claim 2 wherein the desired photon intensity comes from a laser amplifier pumped by a flashlamp.

7. The process of claim 6 wherein said flashlamp is a cesium-neon arc lamp.

8. The process of claim 2 wherein said pulsed intensity is at least 10^{11} W/cm^2.

9. The process of claim 2 wherein the molecule ratio of said hydrogen to said nitrogen is 2:1.

10. The process of claim 2 wherein the method of cooling is a cyclic water flow system equipped with a heat exchanger.

11. The process of claim 2 wherein said hydrazine is cooled to ordinary temperature and pressure (1 atm and 25°C).

12. A process for producing hydrazine with nitrogen and water as raw materials and comprising the steps of:

A) generating a large number of photons from a high-energy laser-pulsed source;

B) producing photons with increased pulse intensity after traversing a laser amplifier pumped by an arc lamp;

C) introducing said intensified pulsed laser photons to excite nitrogen molecules from said nitrogen raw materials through a two-photon absorption process so that said nitrogen molecules are induced to make transitions from the ground vibrational state thereof to excited vibrational states in the ground electronic configuration;

D) flowing said nitrogen, after said laser pulse excitation to produce excited nitrogen, into a vessel containing water so as to have good mixing between said excited nitrogen and said water; and

E) providing an outlet so that the gas molecules consisting of the ground states of O_2 and N_2 can bubble out.

13. The process of claim 12 wherein the photons used are XeCl excimer laser photons (wavelength 0.35 μm).

14. The process of claim 12 wherein the photons used are in the shortest visible blue with wavelength of 0.4 μm.

15. The process of claim 12 wherein the photons used have wavelengths between 0.35 μm and 0.4 μm.

16. The process of claim 12 wherein the photons come from a short-pulse laser source.

17. The process of claim 12 wherein said increased photon intensity comes from a laser amplifier pumped by a flashlamp.

18. The process of claim 17 wherein said flashlamp is a lithium-argon arc lamp.

19. The process of claim 12 wherein said pulse intensity is at least 10^{11} W/cm^2.

20. The process of claim 12 wherein the molecular ratio of said water

molecules to said nitrogen molecules is at lest 2: 1.

21. The process of claim 12 wherein said outlet comprises a cyclic water-flow system equipped with a heat exchanger utilizing water operating at room temperature.